AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (original):   A power generation system comprising:

a turbine for converting dynamic energy into rotational energy,

a generator for converting the rotational energy of the turbine into electric energy,

a power controller for performing power control of the electric energy obtained by the generator, and

a power converter for controlling input power and output power in accordance with an instruction from the power controller,

wherein   the power controller includes:

a three-two phase converter for calculating a two-phase current and a two-phase voltage by converting an output voltage and an output current of the generator into a stationary d-q coordinate system;

a generator output calculator for calculating an output of the generator from the two-phase current and the two-phase voltage calculated by the three-two phase converter;

an induced voltage detector for detecting an induced voltage from the two-phase current and the two-phase voltage calculated by the three-two phase converter;

a phase detector for detecting a phase of the induced voltage from the induced voltage detected by the induced voltage detector;

a differentiator for calculating a rotational speed of the induced voltage by differentiating the phase of the induced voltage detected by the phase detector and estimating a shaft speed of the generator; and

a turbine output calculator for calculating an output of the turbine by using the estimated shaft speed value estimated by the differentiator and the output of the generator calculated by the generator output calculator.

2. (original):   A power generation system comprising:

a turbine for converting dynamic energy into rotational energy,

a generator for converting the rotational energy of the turbine into electric energy,

a power controller for performing power control of the electric energy obtained by the generator, and

a power converter for controlling input power and output power in accordance with an instruction from the power controller,

wherein the power controller includes:

a three-two phase converter for calculating a two-phase current and a two-phase voltage by converting an output voltage and an output current of the generator into a stationary d-q coordinate system;

a generator output calculator for calculating an output of the generator from the two-phase current and the two-phase voltage calculated by the three-two phase converter;

a rotor magnetic-flux detector for detecting rotor magnetic flux from the two-phase current and the two-phase voltage calculated by the three-two phase converter;

a phase detector for detecting a phase of the rotor magnetic flux from the rotor magnetic flux detected by the rotor magnetic-flux detector;

a differentiator for calculating a rotational speed of the rotor magnetic flux by differentiating the phase of the rotor magnetic flux detected by the phase detector and estimating a shaft speed of the generator; and

a turbine output calculator for calculating an output of the turbine by using the estimated shaft speed value estimated by the differentiator and the output of the generator calculated by the generator output calculator.

3. (original):   The power generation system according to Claim 1,
wherein   the power controller further comprises:

a turbine torque estimator for calculating a torque of the turbine from the output of the turbine calculated by the turbine output calculator and the estimated shaft speed value; and

a maximum-efficiency operation controller for calculating a shaft speed instruction value from the torque of the turbine calculated by the turbine torque estimator.

4. (original):   The power generation system according to Claim 3,
wherein the maximum-efficiency operation controller comprises:

a torque variation calculator for sampling the torque of the turbine calculated by the turbine torque estimator at constant time intervals and calculating $(T_{tur}(n)-T_{tur}(n-1))/t_s$ to calculate the torque variation $\Delta T_{tur}(n)/t_s$, where a current torque of the turbine is $T_{tur}(n)$, a previous torque of the turbine is $T_{tur}(n-1)$, and the torque variation is t_s;

an output-coefficient differential equation calculator for calculating a solution of a relational expression of an output coefficient determined depending upon characteristics of the turbine and the torque variation $\Delta T_{tur}(n)/t_s$; and

a generation rate instruction unit for calculating the shaft speed instruction value on the basis of the solution obtained by the output-coefficient differential equation calculator.

5. (original):   The power generation system according to Claim 2,
wherein the power controller further comprises:

a turbine torque estimator for calculating a torque of the turbine from the output of the turbine calculated by the turbine output calculator and the estimated shaft speed value; and

a maximum-efficiency operation controller for calculating a shaft speed instruction value from the torque of the turbine calculated by the turbine torque estimator.

6. (original):   The power generation system according to Claim 5,
wherein the maximum-efficiency operation controller comprises:

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a torque variation calculator for sampling the torque of the turbine calculated by the turbine torque estimator at constant time intervals and calculating $(T_{tur}(n)-T_{tur}(n-1))/t_s$ to calculate the torque variation $\Delta T_{tur}(n)/t_s$, where a current torque of the turbine is $T_{tur}(n)$, a previous torque of the turbine is $T_{tur}(n-1)$, and the torque variation is t_s;

an output-coefficient differential equation calculator for calculating a solution of a relational expression of an output coefficient determined depending upon characteristics of the turbine and the torque variation $\Delta T_{tur}(n)/t_s$; and

a generation rate instruction unit for calculating the shaft speed instruction value on the basis of the solution obtained by the output-coefficient differential equation calculator.

7. (currently amended): The power generation system according to ~~any one of Claims 3 to 6~~Claim 3,
wherein the power controller further comprises:

a micro correction controller including an output variation calculator for sampling the output of the turbine calculated by the turbine output calculator at constant time intervals and calculating a difference $\Delta P(n)$ between a current output of the turbine $P_{tur}(n)$ and a previous output of the turbine $P_{tur}(n-1)$, a proportional gain multiplier for calculating a micro speed instruction value by multiplying the difference $\Delta P(n)$ calculated by the output variation calculator by a proportional gain, and a limiter for limiting the absolute value of the micro speed instruction value calculated by the proportional gain multiplier to a predetermined limitation value; and

an adder for adding the micro speed instruction value calculated by the micro correction controller to the shaft speed instruction value calculated by the maximum-efficiency operation controller and outputting the added value as a new shaft speed instruction value.

8. (original): A control method of a power generation system comprising:
a turbine for converting dynamic energy into rotational energy,
a generator for converting the rotational energy of the turbine into electric energy,

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a power controller for performing power control of the electric energy obtained by the generator, and

a power converter for controlling input power and output power in accordance with an instruction from the power controller,

the control method comprising the steps of:

calculating a two-phase current and a two-phase voltage by converting an output voltage and an output current of the generator into a stationary d-q coordinate system and calculating an output of the generator from the two-phase current and the two-phase voltage;

detecting an induced voltage from the two-phase current and the two-phase voltage;

detecting a phase of the induced voltage from the detected induced voltage;

calculating a rotational speed of the induced voltage by differentiating the detected phase of the induced voltage and estimating a shaft speed of the generator; and

calculating an output of the turbine by using the estimated shaft speed value and the calculated output of the generator.

9. (original): A control method of a power generation system comprising:

a turbine for converting dynamic energy into rotational energy,

a generator for converting the rotational energy of the turbine into electric energy,

a power controller for performing power control of the electric energy obtained by the generator, and

a power converter for controlling input power and output power in accordance with an instruction from the power controller,

the control method comprising the steps of:

calculating a two-phase current and a two-phase voltage by converting an output voltage and an output current of the generator into a stationary d-q coordinate system and calculating an output of the generator from the two-phase current and the two-phase voltage;

detecting rotor magnetic flux from the two-phase current and the two-phase voltage;

detecting a phase of the rotor magnetic flux from the detected rotor magnetic flux;

calculating a rotational speed of the rotor magnetic flux by differentiating the detected phase of the rotor magnetic flux and estimating a shaft speed of the generator; and

calculating an output of the turbine by using the estimated shaft speed value and the calculated output of the generator.

10. (original): The control method of a power generation system according to Claim 8, further comprising the steps of:

calculating a torque of the turbine from the calculated output of the turbine and the estimated shaft speed value; and

calculating a shaft speed instruction value from the calculated torque of the turbine.

11. (original): The control method of a power generation system according to Claim 10, wherein the step of calculating the shaft speed instruction value from the calculated torque of the turbine comprises the steps of:

sampling the calculated torque of the turbine at constant time intervals and calculating $(T_{tur}(n)-T_{tur}(n-1))/t_s$ to calculate a torque variation $\Delta T_{tur}(n)/t_s$, where a current torque of the turbine is $T_{tur}(n)$, a previous torque of the turbine is $T_{tur}(n-1)$, and the torque variation is t_s;

calculating a solution of a relational expression of an output coefficient determined depending upon characteristics of the turbine and the torque variation $\Delta T_{tur}(n)/t_s$; and

calculating the shaft speed instruction value on the basis of the calculated solution.

12. (original): The control method of a power generation system according to Claim 9, further comprising the steps of:

calculating a torque of the turbine from the calculated output of the turbine and the estimated shaft speed value; and

calculating a shaft speed instruction value from the calculated torque of the turbine.

13. (original): The control method of a power generation system according to Claim 12, wherein

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the step of calculating the shaft speed instruction value from the calculated torque of the turbine comprises the steps of:

sampling the calculated torque of the turbine at constant time intervals and calculating $(T_{tur}(n)-T_{tur}(n-1))/t_s$ to calculate a torque variation $\Delta T_{tur}(n)/t_s$, where a current torque of the turbine is $T_{tur}(n)$, a previous torque of the turbine is $T_{tur}(n-1)$, and the torque variation is t_s;

calculating a solution of a relational expression of an output coefficient determined depending upon characteristics of the turbine and the torque variation $\Delta T_{tur}(n)/t_s$; and

calculating the shaft speed instruction value on the basis of the calculated solution.

14. (currently amended): The control method of a power generation system according to ~~any one of Claims 10 to 13~~Claim 10, further comprising the steps of:

sampling the calculated output of the turbine at constant time intervals and calculating a difference $\Delta P(n)$ between a current output of the turbine $P_{tur}(n)$ and a previous output of the turbine $P_{tur}(n-1)$;

calculating a micro speed instruction value by multiplying the calculated difference $\Delta P(n)$ by a proportional gain;

limiting the absolute value of the calculated micro speed instruction value to a predetermined limitation value; and

adding the calculated micro speed instruction value to the calculated shaft speed instruction value and outputting the added value as a new shaft speed instruction value.

15. (new): The power generation system according to Claim 5,
wherein the power controller further comprises:

a micro correction controller including an output variation calculator for sampling the output of the turbine calculated by the turbine output calculator at constant time intervals and calculating a difference $\Delta P(n)$ between a current output of the turbine $P_{tur}(n)$ and a previous output of the turbine $P_{tur}(n-1)$, a proportional gain multiplier for calculating a micro speed instruction value by multiplying the difference $\Delta P(n)$ calculated by the output variation calculator by a proportional gain, and a limiter for limiting the absolute value of the micro speed

instruction value calculated by the proportional gain multiplier to a predetermined limitation value; and

an adder for adding the micro speed instruction value calculated by the micro correction controller to the shaft speed instruction value calculated by the maximum-efficiency operation controller and outputting the added value as a new shaft speed instruction value.

16. (new): The control method of a power generation system according to Claim 12, further comprising the steps of:

sampling the calculated output of the turbine at constant time intervals and calculating a difference $\Delta P(n)$ between a current output of the turbine $P_{tur}(n)$ and a previous output of the turbine $P_{tur}(n-1)$;

calculating a micro speed instruction value by multiplying the calculated difference $\Delta P(n)$ by a proportional gain;

limiting the absolute value of the calculated micro speed instruction value to a predetermined limitation value; and

adding the calculated micro speed instruction value to the calculated shaft speed instruction value and outputting the added value as a new shaft speed instruction value.